



Integrating physical and financial approaches to manage environmental financial risk

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Physical and/or engineered solutions have long been used to manage risks associated with adverse environmental events. Examples include reservoirs as a tool for mitigating drought-related supply risk, levees for managing flood risk and dredging of inland waterways to ensure navigability during low flow periods. These measures can reduce many types of risk (e.g., loss of life), but are often employed as a means of protecting against financial losses. When the focus is on managing environmental financial risk, physical solutions can be effective, but also costly. In many cases, non-physical tools can provide a less expensive means of managing financial risk, with these often taking the form of financial instruments such as hedging contracts, contingency funds or insurance. Some of these instruments, such as flood insurance, are widely available, but historically many environmental financial risks have been managed primarily (or solely) via physical solutions without much consideration of alternatives, thereby opening opportunities for innovation in developing financial solutions.

Recent research has demonstrated that financial instruments can play a significant role in managing drought-related financial risk in sectors as diverse as water utilities, energy generation and inland navigation. Nonetheless, this work has largely considered the use of these instruments within systems in which physical solutions are already in place (but failing to achieve desired performance). The next step in the evolution of managing environmental financial risk involves developing methods for designing risk management strategies that do not assume an established physical system. Here the goal is to identify the relative role that physical solutions and financial instruments should play as they are integrated into a comprehensive risk management strategy. This is not a straightforward challenge as one approach reduces the risk of financial losses and the other redistributes those losses, thereby making a direct comparison difficult. This discussion will focus on a conceptual approach to considering questions such as what proportion of the drought-related financial risk faced by inland shipping should be managed via “hedging” versus “dredging”. Examples from other sectors will be discussed as well.